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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/605,736	10/22/2003	Robin L Wang	19441-0011	2735

29052 7590 01/08/2008  
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EXAMINER
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WARTALOWICZ, PAUL A

ART UNIT	PAPER NUMBER
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1793

MAIL DATE	DELIVERY MODE
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01/08/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/605,736	<b>Applicant(s)</b> WANG ET AL.	
	<b>Examiner</b> Paul A. Wartalowicz	<b>Art Unit</b> 1793	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13 and 15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

Applicant's arguments filed 10/19/07 have been fully considered but they are not persuasive.

Applicant argues that one of ordinary skill in the art would not be inclined to modify Schmidt for the conversion of heavy hydrocarbons as suggested.

However, the claim requires that the reactant stream comprise heavy hydrocarbon and an oxygen stream and a product stream comprising carbon dioxide and hydrogen. It appears that Schmidt teaches this limitation. The claim uses comprising-type open language such that the reactant stream can include a fuel that is not a heavy hydrocarbon. It appears that Schmidt teaches a reactant stream comprising heavy and lighter hydrocarbons and a product stream comprising hydrogen and carbon dioxide. Additionally, it appears that Schmidt teaches the instantly claimed contact time.

Applicant argues that Tamhankar specifically teaches against carbon to oxygen ratios less than 1.5 because it competes with the partial oxidation reaction for available oxygen and that therefore, one of ordinary skill would not be inclined to use a carbon to oxygen ratio of less than about 1.5, because doing so would expressly teach against Tamhankar.

However, Tamhankar expressly teaches that the ratio can be lowered to less than 1.5, and that the resulting process will include a combustion process. The disclosure at [0008] does not teach away from this disclosure in Tamhankar because

Tamhankar specifically teaches in the discussion of the invention that a combustion reaction can be employed with the partial oxidation reaction.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-11, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmidt et al. (U.S. 6254807) and Tamhankar et al. (U.S. 2001/0041159).

Schmidt et al. teach a process for conversion of hydrocarbon fuel to produce an exit gas stream containing hydrogen and carbon monoxide as main reaction products

(col. 3, lines 45-47) comprising providing a feed gas mixture comprising an oxygen containing gas and a heavy hydrocarbon fuel (col. 4, lines 10-15, 26-31) providing a catalytic structure comprising rhodium and nickel (col. 6, lines 16-23) on an alumina support (col. 6, lines 1-6) and passing the feed mixture through the catalytic structure at a temperature of 1000°C (col. 3, lines 39-41), wherein the conversion is operated without the addition of steam or water (water or carbon dioxide is added, col. 3, lines 57-58) and for a contact period of 0.1 to 20 milliseconds (col. 3).

Schmidt et al. fail to teach the feed gas mixture comprising a carbon to oxygen ratio from about 0.5 to about 1.0.

If Schmidt et al. does not inherently meet the limitation of conversion operated without the addition of steam or water, it would be obvious to one of ordinary skill in the art modify the reaction conditions based on Schmidt et al. teaching the presence of steam shifts the product in favor of hydrogen and carbon dioxide shifts the product in favor of CO (col. 4, lines 36-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the reaction conditions, since it has been held that discovering an optimum value or a result effective variable involved only routine skill in the art. In re Boesch, 617 F.2<sup>nd</sup> 272, 205 USPQ 215 (CCPA 1980). The artisan would have been motivated to modify the reaction conditions by the reasoned explanation that the presence of steam shifts the product in favor of hydrogen and carbon dioxide shifts the product in favor of CO (col. 4, lines 36-40) as taught by Schmidt et al.

Tamhankar et al. teach a process for producing synthesis gas [0003] comprising conducting reactions having C:O<sub>2</sub> ratios of less than about 1.5 for the purpose of lowering the initiation temperature [0030].

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide conducting reactions having C:O<sub>2</sub> ratios of less than about 1.5 in Schmidt et al. in order to lower the initiation temperature as taught by Tamhankar et al.

Claims 1-11, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaffney et al. (U.S. 6409940) in view of Schmidt et al. (U.S. 6254807) and Tamhankar et al. (U.S. 2001/0041159).

Gaffney et al. teach a process for converting hydrocarbon fuel to a product stream comprising hydrogen and carbon monoxide (col. 1, lines 13-20) comprising providing a feed gas mixture comprising an oxygen containing gas and a hydrocarbon fuel (col. 6, lines 47-50) providing a catalytic structure comprising nickel and rhodium (col. 5, lines 50-53) disposed on an alumina support (col. 5, lines 56-58) wherein the support is porous (honeycomb, col. 6, lines 5-22) wherein the catalytic structure is maintained at a temperature from 700-1100°C (col. 6, lines 65-67) wherein the contact time is 10 milliseconds or less (col. 4, lines 18-20).

Gaffney et al. fail to teach the hydrocarbon is a heavy hydrocarbon comprising a plurality of hydrocarbon molecules with substantially all molecules containing at least 6

carbons such as diesel, jet fuel, or kerosene. Also, Gaffney et al. fail to teach the feed gas mixture comprising a carbon to oxygen ratio from about 0.5 to about 1.0.

Schmidt et al. teach a process for producing a stream of hydrogen and carbon monoxide (col. 1, lines 5-15) wherein lighter hydrocarbons as well as heavy hydrocarbons can be processed (col. 4, lines 10-15). Schmidt also teach a contact period of 0.1 to 20 milliseconds (col. 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide wherein lighter hydrocarbons as well as heavy hydrocarbons can be processed and the claimed contact period in a similar well-known process as taught by Schmidt et al.

Tamhankar et al. teach a process for producing synthesis gas [0003] comprising conducting reactions having C:O<sub>2</sub> ratios of less than about 1.5 for the purpose of lowering the initiation temperature [0030].

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide conducting reactions having C:O<sub>2</sub> ratios of less than about 1.5 in Gaffney et al. in order to lower the initiation temperature as taught by Tamhankar et al.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gaffney et al. (U.S. 6409940) in view of Tamhankar et al. (U.S. 2001/0041159) and Isogaya et al. (U.S. 4331451).

Gaffney et al. teach a process for converting hydrocarbon fuel to a product stream comprising hydrogen and carbon monoxide (col. 1, lines 13-20) comprising providing a feed gas mixture comprising an oxygen containing gas and a hydrocarbon fuel (col. 6, lines 47-50) providing a catalytic structure comprising nickel and rhodium (col. 5, lines 50-53) disposed on an alumina support (col. 5, lines 56-58) wherein the support is porous (honeycomb, col. 6, lines 5-22) wherein the catalytic structure is maintained at a temperature from 700-1100°C (col. 6, lines 65-67) wherein the contact time is 10 milliseconds or less (col. 4, lines 18-20).

Gaffney et al. fail to teach directing the product gas mixture to a solid fuel cell system.

However, Isogaya et al. teach a process for making a product stream comprising hydrogen and carbon monoxide (col. 1, lines 5-10) and directing product gas to fuel cells (col. 7, lines 35-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide directing product gas comprising hydrogen and carbon monoxide to fuel cells because it is known in the art to do so as taught by Isogaya et al.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gaffney et al. (U.S. 6409940) in view of Schmidt et al. (U.S. 6254807) and Tamhankar et al. (U.S. 2001/0041159) and Isogaya et al. (U.S. 4331451).



Gaffney et al. teach a process for converting hydrocarbon fuel to a product stream comprising hydrogen and carbon monoxide (col. 1, lines 13-20) comprising providing a feed gas mixture comprising an oxygen containing gas and a hydrocarbon fuel (col. 6, lines 47-50) providing a catalytic structure comprising nickel and rhodium (col. 5, lines 50-53) disposed on an alumina support (col. 5, lines 56-58) wherein the support is porous (honeycomb, col. 6, lines 5-22) wherein the catalytic structure is maintained at a temperature from 700-1100°C (col. 6, lines 65-67) wherein the contact time is 10 milliseconds or less (col. 4, lines 18-20).

Gaffney et al. fail to teach directing the product gas mixture to a solid fuel cell system.

However, Isogaya et al. teach a process for making a product stream comprising hydrogen and carbon monoxide (col. 1, lines 5-10) and directing product gas to fuel cells (col. 7, lines 35-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide directing product gas comprising hydrogen and carbon monoxide to fuel cells because it is known in the art to do so as taught by Isogaya et al.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Wartalowicz whose telephone number is (571) 272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Paul Wartalowicz  
January 2, 2008

/Steven Bos/  
Steven Bos  
Primary Examiner  
A.U. 1793